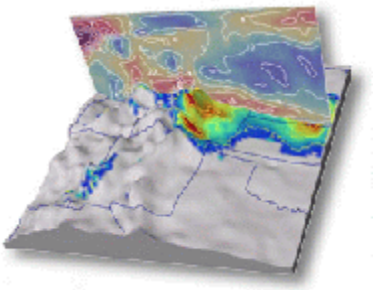
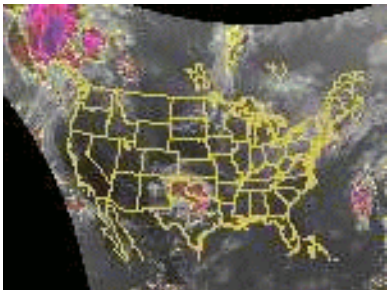
# Forecast Systems Laboratory

## *Transferring technology from lab to operations*



Weather visualization

HPTi supercomputer



IR satellite image

AWIPS console

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### What does the Forecast Systems Laboratory do for the nation?

The Forecast Systems Laboratory (FSL) researches and develops new technologies and scientific advancements that aid atmospheric and oceanographic forecasters, and transfers them to operational elements of NOAA, as well as other operational organizations. FSL anticipates the science and technology that will be needed in the nation's weather and ocean observing operational services in the next five to 10 years. More than ever, the rapid pace of technological change requires that this type of consistent effort be made.

To accomplish this, FSL integrates, evaluates, and applies developments to information and forecast systems. The Laboratory's essential functions include:

- Develop concepts and systems, then validate the specifications necessary for integrating these systems into atmospheric and oceanic information systems, thereby improving research, operations, and information management.
- Use advances in understanding atmospheric and oceanic processes to develop improved data analyses, information management techniques, forecast systems, and forecast methods.
- Use real-time and archived data in research to test and evaluate new diagnostic and forecast techniques. Use results to determine strengths and weaknesses in both the research and the techniques.
- Transfer new techniques and systems to operational use through direct interaction with the users.

### Recent Accomplishments:

- The installation of a supercomputer, the Massively Parallel Processor (MPP). The computer, called JET, as installed initially, consists of 270 fast processors. When fully configured, in about two years, it will consist of over 1500 processors with a peak speed of over 5 trillion arithmetic calculations per second. ***Payoffs: The development of very high resolution mesoscale models such as the Weather Research and Forecast model. This model will be designed to serve both the research and operational communities, and as such, will lead to accelerated advances in atmospheric and ocean forecasting capabilities. A second very important use for JET will be in testing future observing systems. Observing system simulations require extraordinary amounts of processing, since they are accomplished be running models repeatedly with different inputs.***
- Continue an important role with the Advanced Weather Interactive Processing System (AWIPS) system of the National Weather Service (NWS). ***Payoffs: The NWS strategic goals of better warnings and forecasts require improvements in AWIPS. AWIPS is an interactive computer system that integrates all meteorological and hydrological data, and all satellite and radar data, for the first time, and enables the forecaster to prepare and issue more accurate and timely forecasts and warnings.***

- Continue to make significant progress in observing technology. ***Payoffs: For example, ground-based observing, including wind and temperature profiling, and three dimensional water vapor derived from information provided by the the Global Positioning System(GPS), have the potential to improve precipitation prediction by up to 50% in periods out to 36 hours.***

- Improve weather assimilation and models. ***Payoffs: FSL, NWS and the research community are developing a next generation weather model that will greatly increase the accuracy and specificity of weather forecasts.***

## What's Next for FSL?

Science Challenges in the next five to 10 years:

- Further Support the NWS through technology such as the AWIPS software and development of the Rapid Update Cycle (RUC) model. The RUC is a short term forecast model used in commercial and general aviation which supports safer and more efficient in-terminal and in-flight operations.

- Play a central role in the development of the next generation weather forecast model.

- Continuing ongoing efforts of technology transfer with NWS and other operational centers.

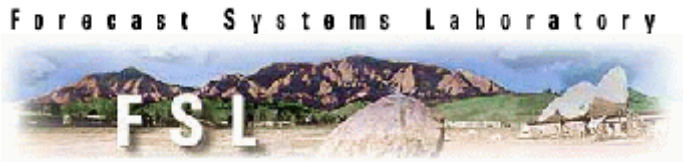
## Research Partnerships:

FSL works with the Cooperative Institute for Research in Environmental Sciences (CIRES) which was established in 1967 to provide a setting for collaborative research and teaching in the wide-ranging disciplines of the environmental sciences. CIRES is a NOAA joint/cooperative institute and supplies support to facilitate collaborations among scientists at the University of Colorado, NOAA, and other institutions.

FSL also works with another joint/cooperative institute, the Cooperative Institute for Research in the Atmosphere (CIRA). CIRA was established in 1980 to increase the effectiveness of atmospheric research in areas of mutual interest between NOAA, Colorado State University and other groups.

## Budget and Staff:

FSL is a $26.4 million laboratory ($8 million from NOAA base) located in Boulder, Colorado with 206 employees, including 83 federal, 70 university, and 43 contract employees.

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